

FORM PTO-1399 (Modified)
(REV 11-98)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

R.34873

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.5)

09/622132INTERNATIONAL APPLICATION NO.
PCT/DE 99/03901INTERNATIONAL FILING DATE
07 December 1999PRIORITY DATE CLAIMED
16 December 1998

TITLE OF INVENTION

ELECTRONIC CONTROL UNIT

APPLICANT(S) FOR DO/EO/US

RAU, Martin SCHIEFER, Peter

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

Transmittal Sheets in duplicate w/fees charged to Dep.Acct. 07-2100**Copy of German Text Application w/1 sheet drawings****Translation of German Text Application w/1 sheet drawings****Preliminary Amendment****Executed Declaration (Not Enclosed)****Assignment to Robert Bosch GmbH (Not Enclosed)****Copy of PCT/RO/101, PCT/ISA/210 and 220**

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.5)

09/622132

INTERNATIONAL APPLICATION NO.

PCT/DE, 99/03901

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21. The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

- ☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$970.00
- ☒ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$840.00
- ☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$690.00
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$670.00
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$96.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

\$840.00

Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)).

☒ 20 ☐ 30

\$130.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	- 20 =	0	x \$18.00	\$0.00
Independent claims	- 3 =	0	x \$78.00	\$0.00
Multiple Dependent Claims (check if applicable).			<input type="checkbox"/>	\$0.00
TOTAL OF ABOVE CALCULATIONS =				\$970.00

Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable).

☐

\$0.00

SUBTOTAL =

\$970.00

Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)).

☐ 20 ☐ 30

\$0.00

TOTAL NATIONAL FEE =

\$970.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).

☐

\$0.00

TOTAL FEES ENCLOSED =

\$970.00

Amount to be:	\$
refunded	
charged	\$

☐ A check in the amount of _____ to cover the above fees is enclosed.

☒ Please charge my Deposit Account No. **07-2100** in the amount of **\$970.00** to cover the above fees.
A duplicate copy of this sheet is enclosed.

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **07-2100** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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SIGNATURE

Ronald E. Greigg

NAME

31,517

REGISTRATION NUMBER

11 August 2000

DATE

534 Rec'd PCT/PTO 11 AUG 2000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Martin Rau et al

Based on PCT/DE 99/03901

For: Electronic Control Unit

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE TITLE

Please change the title to read as follows:

--ELECTRONIC CONTROL UNIT FOR CONTROLLING DIFFERENT
COMPONENTS OF A MOTOR VEHICLE--.

IN THE SPECIFICATION

Page 1, delete line 4 and insert --for controlling different components of a motor vehicle.--;

line 23, delete "contact" and insert --contacts--.

Page 2, line 3, after "printed" insert --circuit--;

line 4, delete "bond" and insert --bonding--;

lines 23 and 24, delete "having the characteristics of the body of claim

1".

Page 3, line 5, delete "a BS" and insert --ABS--.

Page 4, lines 2 and 3, delete "by the characteristics recited in the dependent claims" and insert --as set forth hereinafter--.

Page 5, line 24, after "modules" insert --that--.

Page 6, line 16, delete "includes" and insert --include--.

Page 7, line 5, before "Drawing" insert --Brief Description of the--;

line 7, delete "drawings" and insert --drawing--;

line 10, delete "an" and insert --the--;

line 11, delete "Fig. 1" and insert --The drawing--.

Page 8, line 15, delete "it" and insert --the production--.

Page 10, line 7, delete "it" and insert --the connector part--;

line 22, delete "in".

Page 11, line 1, delete "through";

line 6, after "shown" insert a comma;

line 14, before "housing" insert --metallic--;

line 20, delete "2" and insert --3--;

line 22, delete "Fig. 1," and insert --the drawing--.

Page 12, line 9, delete "Fig. 1," and insert --the drawing--;

after line 24 insert the following paragraph:

--The foregoing relates to a preferred exemplary of embodiments of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.--.

IN THE CLAIMS

Page 13, line 1, delete "Claims" and insert --We Claim--.

Please cancel claims 1-10 and add new claims 11-24.

11. An electronic control unit, comprising a component board (3) on an assembly side (4) of which a plurality of electronic modules (10, 11, 12, 13), are provided with a separate electrical control circuit, an electrical control circuit of an electronic module generates at least one control function for controlling a respective operating device disposed outside the control unit, for electrically connecting the operating devices to the electronic modules (10, 11, 12, 13), a plurality of connector parts (20, 21, 22) are provided with contact elements (50) which are disposed separately on the assembly side (4) of the component board (3), and each electronic module is assigned at least one connector part, which is disposed on the component board in a vicinity of each respective electronic module and is electrically conductively connected to each respective electronic module via line connections (41) mounted on the component board (3).

12. The electronic control unit of claim 11, in which the connector parts (20, 21, 22) are embodied for receiving a counterpart connector, connected to the connecting lines of the operating devices, which counterpart connectors can be plugged into the connector parts (20, 21, 22) perpendicular to the assembly side (4) of the component board (3).

13. The electronic control unit of claim 12, in which the connector parts (20, 21, 22) are surface-mounted components (SMDs), and that the contact elements (50) of the connector parts are soldered, by their end portions facing toward the assembly side (4) of the component board (3), to the line connections (41) of the component board.

14. The electronic control unit of one of claim 11, in which further line connections (42, 43) are provided on the component board, which without an interposition of electrical or electronic components electrically connect at least one contact element (50) of a connector part (20) to another contact element (50) of the same connector part, or to a contact element (50) of a different connector part (21).

15. The electronic control unit of one of claim 12, in which further line connections (42, 43) are provided on the component board, which without an interposition of electrical or electronic components electrically connect at least one contact element (50) of a connector part (20) to another contact element (50) of the same connector part, or to a contact element (50) of a different connector part (21).

16. The electronic control unit of one of claim 13, in which further line connections (42, 43) are provided on the component board, which without an interposition of electrical or electronic components electrically connect at least one contact element (50) of a connector part (20) to another contact element (50) of the same connector part (21), or to a contact element (50) of a different connector part (21).

17. The electronic control unit of claim 11, in which electric power components (31) are mounted directly on the assembly side (4) of the component board (3) and are electrically connected to at least one electronic module and/or at least one connector part (21) via line connections (44) of the component board.

18. The electronic control unit of claim 11, in which a common power supply unit (33) for all the electronic modules (20, 21, 22) is disposed on the component board (3) and is electrically conductively connected to the electronic modules (20, 21, 22) and/or connector parts (20, 21, 22) via line connections of the component board.

19. The electronic control unit of claim 11, in which a common signal processing device (32) for all the electronic modules (20, 21, 22) is disposed on the component board (3) and is electrically conductively connected to the electronic modules (10, 11, 12) and/or connector parts (20, 21, 22) via line connections (45) of the component board.

20. The electronic control unit of claim 11, wherein relatively large passive components (34) are mounted directly on the assembly side (4) of the component board (3) and are electrically conductively connected to the electronic modules (10, 11, 12) via line connections (46) of the component board.

21. The electronic control unit of claim 11, wherein the electrical control circuit of an electronic module (10, 11, 12) includes at least one microprocessor (61) for each separate electronic module.

22. The electronic control unit of claim 11, wherein the component board (3) is mounted with a side (5) remote from the assembly side (4), onto a housing part (2) of the control unit.

23. The electronic control unit of claim 12, wherein the component board (3) is mounted with a side (5) remote from the assembly side (4), onto a housing part (2) of the control unit.

24. The electronic control unit of claim 13, wherein the component board (3) is mounted with a side (5) remote from the assembly side (4), onto a housing part (2) of the control unit.

IN THE ABSTRACT

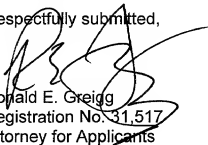
Please substitute the attached Abstract for the original abstract as filed.

REMARKS

The above amendments are being made to place the application in better condition for examination.

Entry of the amendment is respectfully solicited.

Respectfully submitted,


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Abstract

An electronic control unit having a component board on an assembly side of which a plurality of electronic modules, are provided with a separate electrical control circuits. The electrical control circuit of an electronic module generates at least one control function for controlling a respective operating device disposed outside the control unit. In order to simplify the disposition and layout of the line connections on the component board and to increase the scale of integration of the component board, the operating devices are electrically connected to the electronic modules. A plurality of connector parts provided with contact elements are disposed separately on the assembly side of the component board, and each electronic module is assigned at least one connector part, which is disposed on the component board in a vicinity of this electronic module and is electrically conductively connected to this electronic module via line connections mounted on the component board.

09/622132

534 Rec'd PCT/PTO 11 AUG 2000

ELECTRONIC CONTROL UNIT

Prior Art

The invention relates to an electronic control unit having the characteristics recited in the preamble to claim 1.

5 From German Patent Disclosure DE 196 05 966 A1, a component board for an electronic control unit is already known that is provided with a plurality of electronic modules on its assembly side. Each of the electronic modules is provided with a respective electronic circuit, which independently of the other electronic modules generates at least one separate function of the control unit. By combining various electronic modules on the component board, the control unit can be adapted to a given profile of requirements with regard to the triggering of various operating units. For instance, it is possible for a plurality of electronic modules for controlling the engine, anti-lock braking system, electronic gas pedal, adaptive cruise control radar, actuators, or other operating devices of a motor vehicle to be disposed on a component board in a central control unit of the motor vehicle.

A disadvantage of the known control units is that the component board for connecting the operating devices is provided with electrical contact through a push-on terminal strip or conductor foil, which is connected to plug connectors

outside the control unit. The conductor foil or push-on terminal strip is electrically connected on one side of the component board to the printed conductors of the component board, for instance by soldering or via bond wires. Since all the terminals are disposed on one side of the component board, a complicated course of printed conductors on the component board is required for electrically connecting the many connection lines with associated electronic modules. For instance, some printed conductors must be extended across the entire component board to an electronic module located at a distance from the push-on terminal strip. Furthermore, the component board must be adapted to the width of the push-on terminal strip or conductor foil; otherwise, not all the contact elements of the push-on terminal strip or conductor foil can be connected to the component board. Since the number of contact elements of the push-on terminal strip or conductor foil increases sharply on the component board as the scale of integration increases, suitably wide component boards must be used, thus increasing the production costs of the control unit considerably and increasing the amount of space required by the control unit in the motor vehicle.

Advantages of the Invention

The control unit of the invention having the characteristics of the body of claim 1 overcomes these disadvantages and makes it possible for electronic modules with different control functions to be disposed on the same

component board, without requiring a complicated course of printed conductors or connection of the electronic modules to the same push-on terminal strip. For electrically connecting operating devices, such as operating devices of a motor vehicle, such as the engine, a BS, electronic gas pedal, adaptive cruise control radar, and so forth, a plurality of separate connector parts provided with contact elements are advantageously disposed directly on the assembly side of the component board; each electronic module is assigned at least one connector part, which is disposed on the component board in the vicinity of this electronic module and is electrically conductively connected to this electronic module via line connections mounted on the component board. Advantageously, by means of the separate connector parts, the disposition and layout of the line connections on the component board are simplified greatly. The separate connector parts are simply connected directly to the adjacently disposed electronic modules via short line connections of the component board. Advantageously, the size of the component board can be reduced and the scale of integration of the control unit can be increased. The control unit can be adapted very simply to different requirement profiles, by either disposing further electronic modules with connector parts assigned to them on the component board or leaving them out. For this purpose, a complicated modification of the layout or conductor course on the component board is unnecessary.

Advantageous features and refinements of the invention are made possible by the characteristics recited in the dependent claims.

Advantageously, the connector parts are embodied for receiving counterpart connectors, connected to the connecting lines of the operating devices, which counterpart connectors can be plugged into the connector parts perpendicular to the assembly side of the component board. By this means, an especially high scale of integration on the component board is attained, since no additional space must be made on the sides of the connector parts for inserting the counterpart connectors. The counterpart connectors are electrically contacted with the connector parts simply in a direction perpendicular to the assembly side of the component board.

It is also advantageous to embody the connector parts as surface-mounted components (SMDs), and to solder the contact elements of the connector parts, by their end portions facing toward the assembly side of the component board, onto the line connections of the component board. The SMD connectors can then be soldered to the line connections in a simple way by the easily mastered reflow soldering process.

It is especially advantageous if further line connections are provided on the component board, which without the interposition of electrical or electronic components electrically connect at least some of the contact elements of

a first connector part to one another, or to some of the contact elements of a second connector part. This provision avoids the necessity of providing the operating device connection cables, connected to the push-on terminal strips, with separate terminal strips or connector bridges outside the control unit. In the prior art, such separate terminal strips and connector bridges are required in order to split or separate or join together the individual strands of the cable harnesses outside the control unit. This function of the cable harness can advantageously be taken over by line connections disposed on the component board. In particular, connector bridges, which connect the contact elements of one connector part directly to one another, can advantageously be disposed on the component board.

Advantageously, heat-generating electric power components can be mounted directly on the assembly side of the component board and electrically connected to the electronic modules and/or at least one connector part via line connections of the component board. As a result, a better heat transfer to the underside of the component board is possible, which can for instance be coupled with a heat sink.

It is also advantageous for a common power supply unit and a common signal processing device to be provided for all the electronic modules are disposed on the component board and to be electrically conductively connected to the electronic modules and/or connector parts via line connections of the

component board. Since this dispenses with a separate signal processing and power supply unit of the electronic modules, the scale of integration of the control unit can be increased still further. The electronic modules themselves can be produced by various production technologies and can thus be optimized in terms of cost for a given electronic module.

Relatively large passive components, which would claim a great deal of space on the electronic modules, can be mounted directly on the assembly side of the component board and be electrically conductively connected to the electronic modules via line connections of the component board. As a result, the size of the electronic modules can be reduced, which is advantageous especially if the electronic modules have an expensive carrier substrate.

It is also advantageous if the electrical control circuit of an electronic module includes at least one microprocessor of its own. Since the control functions of the other electronic modules are not dependent on the computation power of this microprocessor, the microprocessor can advantageously be adapted to the computation power required for the control function of the electronic module. Impairment of the function of the other electronic modules if a single electronic module fails is also avoided. The reliability of the entire system can thus be advantageously enhanced.

For better heat dissipation, the component board can advantageously be mounted, by the side remote from the assembly side, onto a housing part, acting as a heat sink, of the control unit.

5 Drawing

One exemplary embodiment of the invention is shown in the drawings and will be described in further detail below.

Fig. 1 shows a perspective, schematic view of a control unit of the invention, without the cap part.

10 Description of an Exemplary Embodiment

Fig. 1 shows a schematic view of a control unit of the invention with the housing cap removed. A component board 3, which for example can be a multi-layer printed circuit board, a ceramic multi-layer substrate, a plastic carrier with stamped inlay parts, or a three-dimensional printed circuit board, a so-called 3-D MID (molded interconnect device) substrate, or other carrier, is mounted by its underside 5 on a metal housing bottom 2. A housing cap, not shown, can be placed on the housing bottom 2, so that the component board 3 is disposed in protected fashion in a control unit housing. A plurality of electronic modules 10, 11, 12 and 13, which can be made by various technologies, are disposed on the assembly side 4, opposite the underside 5, of the component board 3.

The electronic module 10 for instance includes a printed circuit board or PCB 15, for instance, with a plurality of components 61, 62, 63 connected to one another via printed conductors and disposed on the PCB 15. The electronic module 5 11 is made by hybrid technology as a ceramic substrate 16, for instance, with components 61, 64. Another electronic module 12 is embodied for instance as multi-chip module (MCM). The electrical and electronic components of the electronic module 13 are mounted directly on the component board and are covered 10 with a protective cap. Still other embodiments of the electronic modules are possible. It is advantageous that not all the control circuits are manufactured by the same production technique, but that instead each of the electronic modules can be made by whatever is the most economical 15 technique for it.

The electrical and electronic components of each electronic module form an electrical control circuit, each for controlling one operating device disposed outside the control unit. The control unit 1 shown in Fig. 1 can for instance be 20 installed in a motor vehicle for triggering various operating devices of the motor vehicle. The electronic module 10 is intended for instance for triggering an ignition system, while the electronic module 11 is used to trigger an ABS system (anti-lock brake system). Other electronic modules 12, 13 can 25 serve for instance to trigger motor-driven window controls or for controlling an electronic gas pedal. To furnish an additional function of the control unit, a further electronic

module can simply be mounted on the component board. In this way, it is possible to adapt the control unit 1 to a given requirement profile in a very flexible way. Each electronic module has at least one microprocessor 61 of its own, whose computation power is optimally adapted to the control function of the electronic module. A microprocessor assigned to a plurality of electronic modules in common, which must always be designed as large enough that its computation power suffices even if additional electronic modules are included on the component board, is dispensed with. This advantageously prevents the failure of all the electronic modules if the microprocessor of a single electronic module should fail.

A plurality of separate connector parts 20, 21 and 22 are also mounted on the assembly side 4 of the component board 3. Each electronic module is assigned at least one connector part. For instance, the connector part 20 and the connector part 22 are assigned to the electronic module 10, a connector part, not shown, that is to be mounted at the location of the dashed line 23 is assigned to the electronic module 11, and the connector part 22 is assigned to the electronic modules 12, 13. The connector parts are mounted directly on the assembly side 4 of the component board in the vicinity of the electronic modules associated with them, and they are electrically conductively connected to the associated electronic modules via line connections 41 of the component board 3. Each connector part is placed in such a way that taking into account the position of the electronic modules to

which this connector part is assigned, the various line connections 41 to the electronic modules can be made quite short overall. The line connections can be embodied as printed conductors, stamped metal parts, or in some other way.

5 The connector parts 20, 21, 22 include an insulating connector housing, with a plurality of contact elements 50 disposed in it. The contact elements 50 are oriented perpendicular to the assembly side 4, so that a respective counterpart connector, which is connected to the connection cable of an operating

10 device, can be inserted into the associated connector part perpendicular to the assembly side 4. The end portions, toward the assembly side 4, of the contact elements 50 are electrically contacted on the underside of the connector housing with the line connections 41. If the connector parts

15 20, 21, 22 are embodied as SMD (surface mounted device) connectors, then it is possible for instance to solder the contact elements 50 to connection faces 52 of the line connections 41 by reflow soldering. Then the connector parts can advantageously be soldered together with other components

20 to the assembly side of the component board. However, the connector parts can also be soldered with connector lugs, protruding from the underside, in via-holes of the component board, or can be mounted on the component board 3 in some other way. The electronic modules 10-13 can be connected to

25 the line connections in various ways. For instance, the PCB 15 of the electronic module 10 can be provided with contact faces on the underside, which are connected to the components 61, 62, 63 and printed conductors on the top of the PCB 15

through via-holes. The contact faces on the underside can then be contacted with the line connections 41 via an electrically conductive adhesive or via solder bumps. It is also conceivable for the electronic circuit of the electronic modules to be contacted with the line connections via bond wires, for instance. As shown taking the electronic module 12 as an example, the electronic modules can also be provided with terminal pins and soldered directly to the line connections 41 on the assembly side 4.

As also shown in Fig. 1, power components 31 are mounted on the assembly side 4 of the component board 3. The power components 31, which heat up markedly during operation, can advantageously dissipate their heat via the underside of the component board 3 to the housing bottom 2. The power components 31 are connected to the connector parts or electronic modules via high-current-carrying line connections 44 of the component board. Individual discrete components 34 such as large capacitors that would occupy a very great deal of space on the electronic modules can be mounted directly on the component board 2 and connected to the associated electronic module 10 via line connections 46.

In the component board shown in Fig. 1, it is also provided that there be a common power supply unit 33 on the component board 3. The power supply unit 33 is connected to the electronic modules and/or connector parts via line connections, not shown, of the component board 3, such as a

large-area internal printed conductor of the component board.
A signal processing device 32, common to all the electronic
modules is also provided, which is connected to the electronic
modules and/or connector parts 20, 21, 22 via line connections
45. Thus data, detected for instance by sensors mounted in
the vehicle, regarding the temperature, rpm or pressure
conditions in the engine can be processed and transmitted to
the electronic modules.

As can also be seen in Fig. 1, individual line
connections 42 on the component board are provided which
connect a contact element 50 of one connector part to a
contact element 50 of another connector part. The cable
harness connections of the connection lines can thus
advantageously already be made on the component board 3. It
is furthermore possible, as shown inside the dashed line 23,
to form connector bridges by means of line connections 43 of
the component board, which connect two contact elements 50 of
one connector part to one another.

A metal cap part, which has recesses for receiving the
connector parts 20, 21, 22, is placed on the housing bottom
part 2. The connector parts can be sealed off with sealing
rings or lines of adhesive in the recesses of the cap part, so
that the component board 3 is disposed in a closed control
unit housing.

Claims

1. An electronic control unit, having a component board (3) on the assembly side (4) of which a plurality of electronic modules (10, 11, 12, 13), provided with an electrical control circuit, are disposed, and the electrical control circuit of an electronic module generates at least one control function for controlling a respective operating device disposed outside the control unit, characterized in that for electrically connecting the operating devices to the electronic modules (10, 11, 12, 13), a plurality of connector parts (20, 21, 22) provided with contact elements (50) are disposed separately on the assembly side (4) of the component board (3), and each electronic module is assigned at least one connector part, which is disposed on the component board in the vicinity of this electronic module and is electrically conductively connected to this electronic module via line connections (41) mounted on the component board (3).

2. The electronic control unit of claim 1, characterized in that the connector parts (20, 21, 22) are embodied for receiving a counterpart connector, connected to the connecting lines of the operating devices, which counterpart connectors can be plugged into the connector parts (20, 21, 22) perpendicular to the assembly side (4) of the component board (3).

3. The electronic control unit of claim 2, characterized in that the connector parts (20, 21, 22) are surface-mounted components (SMDs), and that the contact elements (50) of the connector parts are soldered, by their end portions facing toward the assembly side (4) of the component board (3), to the line connections (41) of the component board.

4. The electronic control unit of one of claims 1-3, characterized in that further line connections (42, 43) are provided on the component board, which without the interposition of electrical or electronic components electrically connect at least one contact element (50) of a connector part (20) to another contact element (50) of the same connector part, or to a contact element (50) of a different connector part (21).

5. The electronic control unit of claim 1, characterized in that electric power components (31) are mounted directly on the assembly side (4) of the component board (3) and are electrically connected to at least one electronic module and/or at least one connector part (21) via line connections (44) of the component board.

6. The electronic control unit of claim 1, characterized in that a common power supply unit (33) for all the electronic modules (20, 21, 22) is disposed on the component board (3) and is electrically conductively connected to the electronic

modules (20, 21, 22) and/or connector parts (20, 21, 22) via line connections of the component board.

7. The electronic control unit of claim 1, characterized in that a common signal processing device (32) for all the electronic modules (20, 21, 22) is disposed on the component board (3) and is electrically conductively connected to the electronic modules (10, 11, 12) and/or connector parts (20, 21, 22) via line connections (45) of the component board.

8. The electronic control unit of claim 1, characterized in that relatively large passive components (34) are mounted directly on the assembly side (4) of the component board (3) and are electrically conductively connected to the electronic modules (10, 11, 12) via line connections (46) of the component board.

9. The electronic control unit of claim 1, characterized in that the electrical control circuit of an electronic module (10, 11, 12) includes at least one microprocessor (61) of its own.

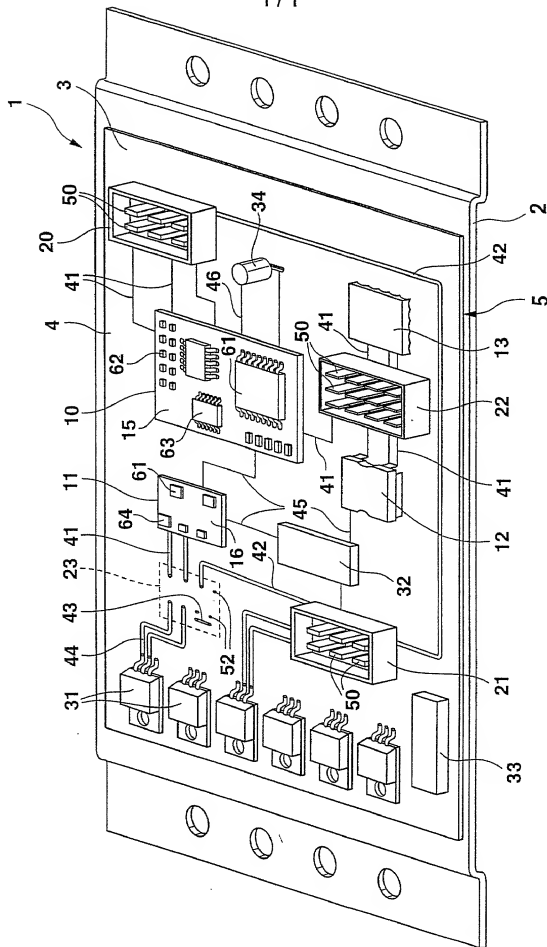
10. The electronic control unit of one of the foregoing claims, characterized in that the component board (3) is mounted, by the side (5) remote from the assembly side (4), onto a housing part (2) of the control unit.

ELECTRONIC CONTROL UNIT

Abstract

In a electronic control unit, having a component board on the assembly side of which a plurality of electronic modules, provided with an electrical control circuit, are disposed, and the electrical control circuit of an electronic module generates at least one control function for controlling a respective operating device disposed outside the control unit, in order to simplify the disposition and layout of the line connections on the component board and to increase the scale of integration of the component board, it is proposed for electrically connecting the operating devices to the electronic modules, that a plurality of connector parts provided with contact elements be disposed separately on the assembly side of the component board, and each electronic module is assigned at least one connector part, which is disposed on the component board in the vicinity of this electronic module and is electrically conductively connected to this electronic module via line connections mounted on the component board.

1/1



Docket No.
R.34873

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

ELECTRONIC CONTROL UNIT

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 07 DECEMBER 1999 as United States Application No. or PCT International Application Number PCT/DE 99/03901 and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

1 98 57 959.4

(Number)

GERMANY

(Country)

16 DECEMBER 1998

(Day/Month/Year Filed)

☒

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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